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ABSTRACT

The paper examines issues involved in providing instruction to severely handicapped individuals in their natural environments. Factors that influence the arrangements made for instruction in community environments are classified according to student factors (such as chronological age, post-school projections, and unique learning and performance characteristics); activity factors (complexity level and the extent to which features of the environment can be replicated); and logistical factors (staff-to-student ratios, transportation, and cost). A model is presented to provide a systematic strategy for determining natural cues and teaching procedures. Five steps in the model are identified: (1) selecting the skills to teach, (2) deciding whether a natural consequence should serve as the sole corrective procedure, (3) selecting relevant natural cues, (4) determining the types of teaching procedures to use in community environments, and (5) determining the data collection procedures that will result in meaningful programmatic change. (CL)

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TEACHING STRATEGIES FOR USE IN COMMUNITY ENVIRONMENTS[1]

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TABLE OF CONTENTS

Page

I. INTRODUCTION 149

A. Contextually-Based Orientations to Instruction 150

II. FACTORS WHICH INFLUENCE THE ARRANGEMENTS MADE FOR INSTRUCTION IN COMMUNITY ENVIRONMENTS 151

A. Student Factors 151

B. Activity Factors 155

C. Logistical Factors 157

III. A NATURAL CUES AND CONSEQUENCES DECISION MODEL 161

A. Selecting the Skills to Teach 163

B. Deciding Whether a Natural Consequence Should Serve as the Sole Corrective Procedure 164

C. Selecting Relevant Natural Cues 165

D. Determining the Types of Teaching Procedures to Use in Community Environments 166

E. Determining the Data Collection Procedures That Will Result in Meaningful Programmatic Changes 174

IV. SUMMARY 179

V. REFERENCES 181

I. INTRODUCTION

Educators of severely handicapped students have seen the focus of curricular and research efforts shift from "how to teach" in the 1960's to "what to teach" in the early 1980's. The techniques of teachers such as Edouard Sequin (1864), Jean Itard (1894) and Maria Montessori (1912) influenced the early development of teaching strategies used by special educators. However, it was not until the last two decades that educators witnessed the emergence of educational strategies from which large numbers of severely handicapped students could benefit. The sixties were marked by the widespread influence of behavior analysts who proposed that teachers could be more effective by: describing behavior more precisely; establishing performance criteria; using elaborate measurement systems; and utilizing techniques such as contingent reinforcement, prompting, and shaping (Baer, Wolf, & Risley, 1968; Bandura, 1969; Skinner, 1968).

In the seventies, with a teaching technology in place, and more knowledge available about the learning and performance characteristics of severely handicapped students (Stokes & Baer, 1977), the foundation was laid for a shift in emphasis from "how to teach" to "what to teach." This period was marked with demonstration projects designed to prove that, through the application of task analysis and sequencing procedures, many complex skills could be broken down into manageable teaching units. Thus, severely handicapped students were successfully taught to perform tasks such as assembling 24-piece bicycle brakes (Gold, 1972, 1974); tying shoes (Martin, Kehoe, Bird, Jensen, & Darbyshire, 1971); and reading using fundamental word attack skills (Entrikin, York, & Brown, 1975).

During the early seventies, most curricula used with severely handicapped students evolved from theories or models of normal development. At that time, there was a tendency to organize curricular content into motor, social, cognitive, self-care, and possibly, prevocational domains. In the latter part of the seventies, this "developmental approach" to curriculum design was subjected to much scrutiny. As educators became aware of the vast discrepancy between the skills taught in classrooms and those required for independent functioning in nonschool environments, or those representative of the "Criterion of Ultimate Functioning" (Brown, Nietupski, & Hamre-Nietupski, 1976), the need for ecologically-oriented strategies became apparent. As a result, curriculum development strategies were generated for the purpose of securing information about the skills necessary to function in specific community environments. Logically, the curricular emphasis shifted again. This time, the shift was from "what to teach" to "where to teach."

Today, it is not uncommon to see, hear, and read about instruction that occurs in a variety of community environments, including restaurants (van den Pol et al., 1981); grocery stores (Wheeler, Ford, Nietpuski, & Brown, 1980); pinball arcades (Hill, Wehman, & Horst, 1982); and public transportation environments (Coon, Vogelsberg, & Williams, 1981; Neef, Iwata, & Page, 1978). Looking toward the future, it appears that the

focus of curricular and research efforts is about to go full circle as it returns to the "how" of service delivery. However, this re-emphasis on "how to teach" has evolved from concerns that are considerably different from those that prompted the research conducted in the 1960's. That is, educators are now concerned with determining techniques that can be effective when applied within the natural contexts of community environments, as opposed to those which are utilized in relatively controlled classroom settings. Thus, before discussing the techniques that should enhance teaching effectiveness in community environments, a review of contextually-based orientations to instruction will be presented.

A. Contextually-Based Orientations to Instruction

Persons functioning in community environments rarely are required to perform skills out of the contexts in which they are appropriate. In the past, a classroom teacher might have spent a 15-minute session providing repeated trials on the fine motor skills of reaching for and grasping irrelevant objects. This isolated approach cannot be viewed as preparation for the skills required to reach toward and grasp change from the cashier at a check-out counter. The context of exchanging money with a cashier involves the performance of a rapid succession of responses in which one response logically sets the occasion for the next (Sailor & Guess, 1983). It follows that in order to prepare a student to emit the responses required in specific community environments a contextually-based strategy that will draw upon the natural order in which such responses typically occur is needed.

The work of Hart, Warren, and their colleagues (Hart & Risley, 1975, 1980; Hart & Rogers-Warren, 1978; Warren, Rogers-Warren, Baer, & Guess, 1980) exemplifies a contextually-based strategy. Their "incidental teaching" strategies have been designed to elicit particular language skills by taking advantage of existing opportunities and by creating new opportunities for such usage. For example, Hart and Risley (1975) systematically prompted and delivered materials contingent on child-initiated verbalizations during free play.

Others have emphasized the need to teach skills in an order that closely approximates that encountered in the natural environment (Guess et al., 1978; Holvoet, Guess, Mulligan, & Brown, 1980). These authors suggested that teachers establish "behavior clusters" as a means to teach severely handicapped students to respond to natural contingencies. They provided the following explanation of a "behavior cluster":

> A behavior cluster is a group of two to six behaviors that are sequenced in an order in which the behaviors commonly occur in the natural environment. In other words, behaviors are taught in context so that the student can also learn to respond to natural discriminative stimuli (Holvoet et al., 1980, p. 340).

A more environmentally-specific approach has been taken by Brown et al. (1980) who recommend that teachers actually enter a community environment and determine the skills required of nonhandicapped persons

as they initiate, proceed through, and terminate an activity. The information secured in specific environments would then provide the contextual basis for instruction. This approach, termed a "nonhandicapped person inventory strategy" was later expanded to include the recording of the natural cues and consequences under which the performance occurred (Falvey, Brown, Lyon, Baumgart, & Schroeder, 1980).

Although these strategies can by no means be considered exhaustive examples of contextually-based orientations to instruction, they do represent significant contributions toward the goal of effective intervention in community environments. Meaningful extensions of these orientations are now needed that will assist teachers when arranging for instruction in community environments and when making decisions about the natural cues and consequences that should be referenced during instruction. Each of these topics will be addressed in subsequent sections of this chapter.

II. FACTORS WHICH INFLUENCE THE ARRANGEMENTS MADE FOR INSTRUCTION IN COMMUNITY ENVIRONMENTS

A variety of arrangements must be made in preparation for instruction in community environments. Initially, decisions must be made about:

a) the exact locations in which instruction will occur;

b) the amount of time that should be allocated to instruction in community environments;

c) the length of instructional sessions, the frequency at which the sessions should occur, and the time between sessions.

A desirable outcome of any educational program is to ensure that a student participates as actively as possible within the community environments in which he/she accesses now or will access at some point in the future. It is apparent that this outcome cannot be achieved by utilizing one particular strategy or by making decisions based on one variable. Rather, success depends on a variety of: a) student factors; b) activity factors; and c) logistical factors. Some of these will be described in this section in relation to how they might influence the arrangements made for instruction in community environments.

A. Student Factors

Decisions about the arrangements made for community instruction might be influenced by at least six student factors, including: chronological age; postschool projections; motoric, sensorial, health-related, and behavioral difficulties; performance history in community environments; parent/guardian information; and unique learning and performance characteristics. Each of these factors are meant to be considered synergically, since they are likely to influence instructional decisions in combination rather than in isolation.

1. Chronological age

Since a goal of instruction is to enable students to participate as actively as possible in community environments as adults, the provision of ample amounts of community instruction becomes increasingly critical as students get older. Students who receive a large amount of community instruction are more likely to graduate with the skills necessary to function in the ultimate settings of concern than those who do not. Therefore, the amount of nonschool instruction should increase with age. For example, while 5-year-old Susan spends most of her school day engaged in school-based instruction, 20-year-old Ralph receives all of his instruction outside of the school building in vocational, recreation/leisure, domestic, and community environments.

Not only should chronological age influence the amount of time ascribed to community instruction, but it should also influence the exact community locations in which instruction is provided. A prime example of how the chronological age of a student can influence the exact location in which instruction occurs is the vocational arrangement made for a severely handicapped adolescent in the Madison Metropolitan School District. A student who is in his/her last year of high school (20 or 21 years of age) is provided instruction in the exact vocational environment in which he/she is expected to function upon graduation (for more information on the vocational placement process see Brown et al., 1983; and Sweet et al., 1982).

Chronological age can also influence the length of an instructional session. For example, many teachers advocate increasing the length of a vocational session as a student's chronological age increases so that by the time a student is 21, he/she can endure an 8 hour workday.

2. Post-school projections

When the precise locations of residential and vocational post-school environments for a particular student are determined prior to graduation, instruction can be provided in those exact locations. Stanley, for example, is 19 years old and has just moved into a Westside group home where it is anticipated that he will continue to live after graduation. Therefore, his teacher plans to provide domestic training in that setting for the next 2 years, as well as recreation/leisure and community instruction in the neighborhood in which the group home is located. This will help to ensure that Stan will acquire the skills necessary to function in those specific environments upon graduation.

3. Motoric, sensorial, health-related, and behavioral difficulties

These variables have been used to either increase or decrease the ratio of school to nonschool instruction provided to an individual student. Too often, teachers use motoric, sensorial, health-related, and/or behavioral difficulties to justify a lack of community programming for a particular student. For example, a teacher offered that due to sensorial difficulties (e.g., deaf/blindness) two of her

students required substantially more school-based instruction than did others in her class who did not experience such difficulties. However, upon further examination of this rationale one might arrive at a very different and more justifiable conclusion. That is, the presence of sensorial difficulties may be a rationale for providing significantly greater amounts of nonschool instruction because of the poor generalization abilities often related to multiple sensory deficits. Greta, for example, is a 14-year-old student who is deaf/blind and profoundly mentally handicapped. She receives most of her instruction in the nonschool environments in which she and her family function, because of her multiple handicaps and the resulting inability to transfer training from one environment to another.

4. Performance history in community environments

Perhaps, one of the most important factors to consider when arranging for instruction in a community environment is the performance history of a student. One can safely assume that students who have demonstrated poor generalization from simulated to nonschool settings in the past will probably continue to experience this problem. The potential for success as a result of simulated instruction in school settings for such students is doubtful. Instruction in actual community environments is preferable. For example, Wanda's training history over the past 5 years in school reveals that she rarely has been able to transfer skills learned in school to community environments. Her teacher has decided, therefore, to provide instruction to Wanda, age 13, only in the community environments in which she will be required to function in the foreseeable future.

5. Parent/guardian information

Parents and other caregivers can offer valuable insights and information concerning a student's ability to function in community environments. Mrs. Castana frequently reports that Jose engages in activities at home that were first taught in school. For example, after learning to tie his shoes in school, he was able to do so at home when dressing in the morning. Whereas Jose was able to benefit from school instruction for this particular activity, this benefit was not realized in another activity. Mrs. Castana reports that he is still unable to order his own food in a restaurant, despite the fact that he has had 2 years of simulated in-school instruction in these skills. Thus, while Jose may benefit from school-based instruction in some areas, he may require community instruction in others.

6. Unique learning and performance characteristics

Several factors related to an individual student's learning style should be considered when making instructional decisions related to location. According to Brown et al. (1982), severely handicapped students, when compared to nonhandicapped peers:

-acquire fewer skills in the same amount of time;
-have poor generalization or transfer of training skills;

-require more instructional time and trials to acquire skills at meaningful performance criteria;
-acquire fewer complex skills;
-experience retention and recoupment problems; and
-rarely synthesize skills acquired in different contexts.

For example, consider Jennifer, a student who learns to perform complex tasks only after large amounts of instructional time and trials, retains few skills without ongoing practice, and rarely generalizes acquired skills to new situations. The instructional location decision which takes these factors into account would involve training only in exact community environments. This situation is in contrast to that of Jeffrey, who has demonstrated rapid skill acquisition and retention as well as good transfer of training across environments. For him, the risks involved in providing school instruction to supplement community training are minimal, as long as verification of the desired performance occurs in the ultimate environments of concern.

Perhaps the learning and performance characteristic that has received the most attention in the literature is that of generalization (see Donnellan & Mirenda, in press, for a review of this issue). Generalization is especially important within the context of this discussion. That is, rarely does a teacher have the luxury of providing instruction in all of the community environments that are significant to each student in his/her class. If such a training model were possible, then selecting the exact locations for instruction would be a fairly easy task. This, however, is not the case. For many students, the community environments in which they are trained are not the exact locations in which performance is ultimately required. Thus, the student's ability to generalize becomes an important factor to consider when determining "where" to teach.

Much of the research conducted in the area of generalization has focused on facilitating generalization from a simulated training environment to a specific community environment of concern. Several researchers have reported that severely handicapped students who were trained in bus-riding (Neef et al., 1978), street crossing (Page, Iwata, & Neef, 1976), and fast food restaurant skills (van den Pol et al., 1981) in training environments designed to simulate the actual settings demonstrated good generalization to nontraining environments. Other studies, however, have reported poor generalization despite the use of this strategy. Coon et al. (1981) and Hill et al. (1982), for example, reported that generalization from training to nontraining environments was poor for students who were taught public transportation and pinball machine use, respectively, despite the introduction of nontraining environment stimuli to the training settings.

Very little of the research conducted in the area of generalization has focused on facilitating generalization from one community environment to another. In accordance with the practice of programming common stimuli (Stokes & Baer, 1977). Livi and Ford (1983) investigated the generalization performance of three severely

handicapped students who were taught to engage in meal preparation and housekeeping activities in a nonschool domestic training environment. When the physical stimuli available in the students' actual homes were used during instruction in the domestic training environment, 100% of the targeted skills generalized. In a study by Ford (1983) which examined the generalization of eight severely handicapped students from one department store setting to another, greater than 77% of the responses acquired in the training environment generalized to the novel department store. However promising these findings, the researchers in these two studies pointed out the limited generalizability of their findings to the broad class of students ascribed the label "severely handicapped." The students participating in these studies had a significant amount of previous community instruction in grocery stores, restaurants, vocational sites, etc. In addition, most were functioning intellectually in the moderate range of mental retardation. Thus, the findings cited must be interpreted guardedly when applied to students who have not experienced such extensive community training or who are less sophisticated intellectually. Additional research is needed in this area to strengthen the information base from which decisions about community instruction can be made. Table 1 contains a decision matrix that can be used as a guide when analyzing the factors which influence the arrangements made for instruction in community environments.

B. Activity Factors

Decisions about the arrangements made for community instruction might be influenced by at least two activity factors: the complexity of the activity; and the extent to which features of the environment and activity can be replicated.

1. Complexity of the activity

Engaging in activities in the community often requires responding to stimuli which are extremely unpredictable and complex. Consider a busy intersection where street crossing will be taught. Some of the stimuli a student must learn to respond to include curbs, curb cuts, the actions of other pedestrians, the walk/don't walk sign, cars in motion, and snow drifts. Adding to the complexity of this activity is the extremely brief period between the point at which the stimuli are presented and the pointat which a response is required (e.g., a "walk" sign is displayed and moments later a student must make a response). The complexity of this and other transportation-related activities has prompted many teachers to begin community instruction with students who are as young as 5 years of age. Furthermore, the frequency at which the sessions occur is often much greater (e.g., on a daily basis) than the sessions arranged for other activities.

2. The extent to which features of the environment and activity can be replicated

Some community activities and environments can be more readily simulated in school settings than others. Street crossing, for example,

TABLE 1

A Matrix of the "Student Factors" Which Influence the Arrangements Made for Instruction in Community Environments

Identify Student:	Chronological Age	Post-school Projections	Student Factors: Motoric, Sensorial, Health-Related, and Behavioral Difficulties	Performance History	Parent/Guardian Information	Unique Learning and Performance Characteristics
How Might This Factor Influence: a) The exact locations in which instruction will occur?						
b) The amount of time allocated to instruction in community environments?						
c) The length of instructional sessions, the frequency at which the sessions should occur, and the time between sessions?						

156

is not conducive to simulation in school, because the stimuli present in actual street environments are too unpredictable, varied, and spontaneous. Other activities, such as swimming in the YMCA pool, spectating at a high school football game, and browsing in a large shopping mall may be virtually impossible to simulate in school.

Some activities, however, can be at least partially simulated in school with a degree of success. For example, George, age 8, receives instruction in a simulated McDonald's restaurant in the classroom, which includes menus, signs, an ordering counter, trays, and seats constructed to replicate some of the stimuli encountered at McDonald's. He is able to transfer much of this training to McDonald's. The skills that he has difficulty generalizing (e.g., reading the menu on the lighted display above the counter, responding to the verbal cue of the clerk, and maneuvering his way back to the table upon receipt of his food) then become the emphases of instruction in the actual community environment.

These activity and environmental factors must be considered in combination with the previously mentioned student factors. A matrix of "Activity Factors" which may influence the arrangements made for instruction in community environments is presented in Table 2.

C. Logistical Factors

Undoubtedly, final decisions about instructional arrangements will be influenced by at least three logistical factors: staff-to-student ratios; transportation; and cost. Whereas many other logistical factors could be discussed here, these three have been selected because they seem to be encountered more frequently than others.

1. Staff-to-student ratios

Few classrooms are staffed with enough personnel to provide 1:1 instruction to each student throughout the school day. Typically, if a teacher chooses to provide 1:1 instruction in the community, it is at the expense of the other students who remain back in the classroom. However, effective group instruction <u>can</u> occur in community environments. The effectiveness of group instruction will be influenced by the size of the group and its make-up. For example, consider a situation where a teacher is to provide instruction to four students in a grocery store. This ratio might influence the selection of the environment. That is, a large grocery store will be better able to discretely accommodate a group of four than a small convenience store. Furthermore, the make-up of the group should also be considered. What if the four were all nonambulatory and in need of intensive physical intervention by the teacher? Imagine the reactions of nonhandicapped shoppers who, upon entering Aisle 10, see four wheelchairs together, and decide to move to another area of the store which is less "crowded." Certainly, a 1:4 staff-to-student ratio is manageable, but the homogeneity of the group might bring undesirable attention to

TABLE 2

A Matrix of the "Activity Factors" Which Influence the Arrangements Made for Instruction in Community Environments

Identify Environment and Activity: _____	Activity Factors	
	Complexity of the Activity	The Extent to Which Features of the Environment and Activity can be Replicated
How Might this Factor Influence: a) The exact locations in which instruction will occur?		
b) The amount of time allocated to instruction in community environments?		
c) The length of instructional sessions, the frequency at which the sessions should occur, and the time between sessions?		

their presence. Instead, a student in a wheelchair might be grouped with three ambulatory students. In addition, 2 of the 4 students might be selected because they are more fluent in their performance and could thus engage in shopping without direct teacher intervention for part of the time.

2. Transportation

The distance between school and a specific community environment will also influence instructional arrangements. For example, grocery stores, shopping malls, and restaurants might be selected because their proximity to school enables students to walk or wheel to them. This practice should not be considered restrictive if a student is attending school close to his/her home and, therefore, is learning to function in the environments he/she is likely to frequent during nonschool hours.

Other decisions about community instruction are influenced by the type of transportation available. For example, Sherry, 11, and Joann, 12, are learning to ride a city bus to a vocational training site which is located downtown. They receive training on Tuesdays. The data related to their acquisition of street crossing and bus riding skills in the downtown area were interpreted to mean that additional training was needed. Thus, arrangements were made for them to travel the same route downtown on Thursdays to the public library, where they would receive instruction in recreation/leisure skills previously identified as objectives in their respective IEP's. Here, the need to increase the frequency of bus riding sessions was one of the factors which influenced these community instructional arrangements.

3. Cost

The cost of an activity should be considered when making arrangements for community instruction. This is not to say that students should be denied access to activities that require money. Rather, costly activities should be scheduled in a manner that will minimize the financial burden on the student and his or her family. For example, what teenager, on a weekly allowance, can afford to go to a movie, eat out in a restaurant, buy an item in a department store, play pinball, and purchase food items from vending machines? Instead of arranging for all of these activities to occur in one week, the costly activities might be scheduled for instruction with more time between them.

Unfortunately, logistical factors are often given priority over individual student needs and activity variables. It is common to hear comments such as "We can't provide instruction on a Friday night" or "There is not transportation available" offered as rationales for a lack of community instruction. Although these factors present real scheduling challenges to the provision of community instruction and cannot be ignored, they alone should not determine the arrangements

TABLE 3

A Matrix of the "Logistical Factors" Which Influence the Arrangements Made for Instruction in Community Environments

Identify Student: _____ Identify Activity: _____	Logistical Factors		
	Staff-to-Student Ratios	Transportation	Cost
How Might This Factor Influence: a) The exact locations in which instruction will occur?			
b) The amount of time allocated to instruction in community environments?			
c) The length of instructional sessions, the frequency at which the sessions should occur, and the time between sessions.			

made for community instruction. Recently, several authors have reported strategies which address such logistical problems (see Hamre-Nietupski, Nietupski, Bates, & Maurer, 1982; and Wehman & Hill, 1982). Creative problem-solving strategies must be generated to find solutions to logistical barriers which unnecessarily limit the amount and location of community instruction. A matrix of "Logistical Factors" which may influence the arrangements made for instruction in community environments is presented in Table 3.

Once decisions have been made about the exact locations in which instruction will occur, the amount of time that should be allocated to instruction in community environments, and the scheduling of the sessions, decisions of a more precise nature can be made. One of the many decisions that needs to be made within that environment pertains to the cues and consequences that should be referenced during instruction.

III. A NATURAL CUES AND CONSEQUENCES DECISION MODEL

Community environments offer a rich variety of cues that rarely lend themselves to the rearrangement strategies typically used in the classroom. For example, in a classroom environment, a teacher may determine that a four-choice discrimination task is "too difficult" for a student, and may rearrange the stimulus array so that the student need only respond to three items. However, the rearrangement strategy that proved successful in the classroom may not be feasible when teaching discrimination skills such as those necessary to select a can of peas from the canned foods section of the grocery store or to locate a pen in the stationery section of the department store. Instead, strategies must be considered that facilitate a discriminative response by drawing a student's attention to the most relevant natural cues[3] without rearranging the complex stimulus array.

To provide a systematic strategy for determining the natural cues to reference and the teaching procedures to use, a decision model has been developed. This model includes decisions about natural cues as well as decisions about natural consequences.[4] A series of questions or decision rules has been formulated to assist teachers when: a) selecting the skills to teach in a community environment; b) deciding whether a natural consequence should serve as the sole corrective procedure; c) selecting relevant natural cues; d) determining the type of teaching procedure to use in a community environment; and e) determining the data collection procedures that will result in meaningful programmatic changes. A schematic representation of these decision rules, entitled, "A Natural Cues and Consequences Decision Model" is presented in Figure 1. It should be

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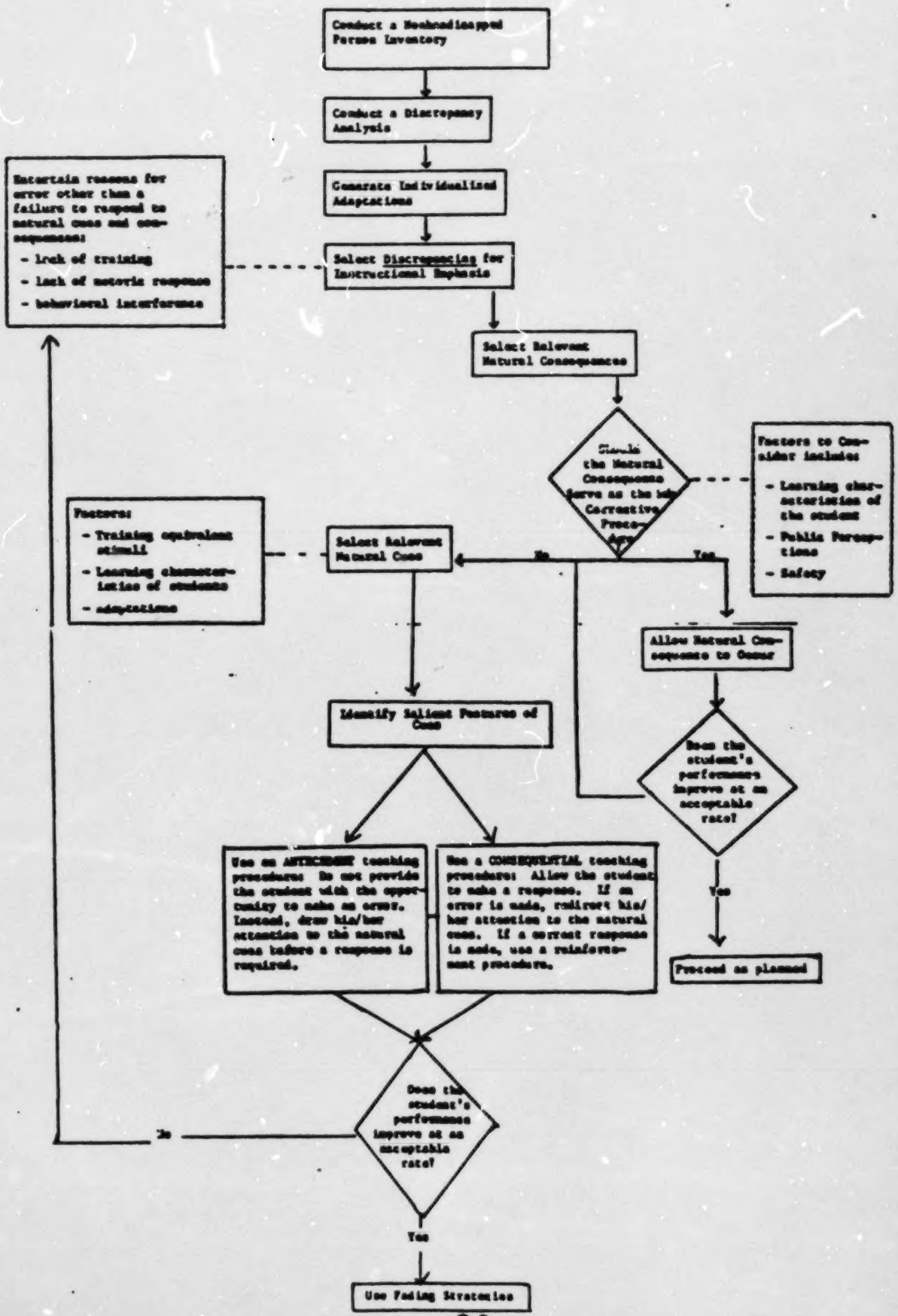
[3] The stimuli that are generally available in an environment and serve to elicit common discriminative responses are referred to here as natural cues.

[4] The stimuli that are generally available in an environment after a response has already occurred and serve to strengthen, maintain, weaken, or eliminate that response are referred to as natural consequences.


Conduct a Handicapped Person Inventory
Conduct a Discrepancy Analysis
Generate Individualized Adaptations
Select Discrepancies for Instructional Emphasis
Ascertain reasons for error other than a failure to respond to natural cues and consequences:
- lack of training
- lack of motoric response
- behavioral interference
Select Relevant Natural Consequences
Should the Natural Consequence serve as the basis for Corrective Procedure
Factors to Consider includes
- Learning characteristics of the student
- Public Perceptions
- Safety
No
Yes
Select Relevant Natural Cues
Factors:
- Training equivalent stimuli
- Learning characteristics of students
- adaptations
Allow Natural Consequence to Occur
Identify Salient Features of Cues
Does the student's performance improve at an acceptable rate?
Use an ANTECEDENT teaching procedure: Do not provide the student with the opportunity to make an error. Instead, draw his/her attention to the natural cues before a response is required.
Use a CONSEQUENTIAL teaching procedure: Allow the student to make a response. If an error is made, redirect his/her attention to the natural cues. If a correct response is made, use a reinforcement procedure.
Yes
Proceed as planned
Does the student's performance improve at an acceptable rate?
No
Yes
Use Fading Strategies

clear from this model that decisions about natural cues and consequences merely form a subset of a larger set of questions that must be answered when determining the most efficacious manner in which to teach a severely handicapped student to function in a community environment.

A. Selecting the Skills to Teach

The first step of the decision model involves conducting a nonhandicapped person inventory, which essentially requires the sequential listing of the skills demonstrated by nonhandicapped persons functioning in a particular environment (Brown et al., 1980). This nonhandicapped person inventory serves two purposes: first, to ascertain the natural order of skills required of persons who generally engage in a particular activity; and second, to prepare a criterion-referenced assessment tool with which the performance of a severely handicapped student can be measured. The performance by a severely handicapped student is then assessed and compared to that of a nonhandicapped person. Following this, the discrepant or "missing" skills from the repertoire of the severely handicapped student are analyzed and targeted for instruction. This phase of the decision process is referred to here and elsewhere (Brown et al., 1980; Ford et al., 1983) as "conducting a discrepancy analysis."

Upon analyzing the discrepancies between the performance required and that exhibited by the severely handicapped student, determinations of "what to teach" can be made. One of the best ways to arrange for more active participation in an activity is through the use of an individualized adaptation that compensates for a specific performance discrepancy. That is, if a severely handicapped student is unable to perform a particular skill due to motoric, communicative, visual, or other deficits, an adaptation might be created so as to allow for more active participation. For example, a severely handicapped student may not be able to remember the items to be purchased in a department store. Furthermore, he or she may not be able to read a list of printed words. Instead, the student might be taught to use a picture list as one way of addressing this discrepancy. The reader interested in further examples and specific strategies for generating a variety of individualized adaptations is referred to Baumgart et al. (1982).

For students with many discrepant skills, it will be important to determine which skills will be taught first. When selecting instructional targets for students with limited response repertoires, Ford et al. (1982) suggested that a teacher consider a number of factors. The following series of questions capsulizes these factors:

Will performance of this skill occur frequently and on a routine basis?

Will this skill occur across a variety of environments and activities?

Will performance of this skill result in less involvement by caregivers?

Will performance of this skill allow a student to further develop motoric, sensorial, and communicative functioning?

Will performance of this skill allow a student to influence the actions of others?

Will performance of this skill help to establish a primary motivational source for engaging in the activity?

Will performance of this skill require that a student interact socially with a nonhandicapped and/or handicapped individual?

Will performance of this skill enhance the development of a life sustaining function?

The process of targeting skills should be influenced by the multiplicity of a student's handicapping condition. Certainly, the performance characteristics of one student will result in an entirely different determination of the skills selected for instructional emphasis than will the performance characteristics of another.

B. Deciding Whether a Natural Consequence Should Serve as the Sole Corrective Procedure

Once the selection of target skills has occurred, an examination of the natural cues and consequences is warranted. One of the first questions posed in the decision model is, "Should the natural consequences serve as the sole corrective procedure?" Rarely can this question be answered affirmatively when severely handicapped students are concerned. That is, most natural consequences do not occur with sufficient magnitude and immediacy for their use to be considered an educationally sound corrective procedure. This seems especially true during the acquisition phase of learning. For example, the response, "waiting at a cash register that is not open," may result in the natural consequence of experiencing an undue amount of wasted time, or receiving corrective verbal feedback from another consumer. Upon making an error of this sort, nonhandicapped persons may display signs of frustration or embarrassment and, at the next opportunity, may take greater care to perform the skill correctly. However, for many severely handicapped students, the provision of such incidental, consequential information alone is not likely to have a significant impact on future performance. Given the subtle nature of the corrective information and what is known about the learning characteristics of severely handicapped students, a decision may be made not to allow the natural consequence to act as the sole corrective procedure.

Additionally, public perceptions may influence decision. For example, Joe, a severely handicapped student, hands the clerk all the money he has. The clerk indicates that the money offered is not enough to cover the cost of the item to be purchased. After repeated questioning, Joe communicates that he has no more money. Meanwhile, the people in line behind him have waited for at least 5 minutes. Finally, Joe is told to

return the item to the shelf. Whereas this natural consequence may have an impact on Joe's subsequent performance, it is doubtful that this should be considered a viable corrective procedure, given the risk of engendering negative public perceptions.

Still another issue relates to the safety of a student. An obvious example of a natural consequence posing a safety problem is that of a student who steps off of a curb into the path of a moving car. The screeching brakes of the car may serve as an effective natural consequence for one who proceeds to cross a street without looking, but it hardly represents a safe instructional option. When a teacher decides that the natural consequence should not serve as the sole corrective procedure, the decision-making process shifts to a natural cue orientation (see the left portion of the schematic representation depicted in Figure 1, p.162).

C. Selecting Relevant Natural Cues

Each response made in a community environment is preceded by specific natural cues. For example, in a sit-down restaurant, a student must acknowledge the presence of the waiter and the verbal cue "Can I take your order?" (both natural cues) before touching the picture card he may use to communicate his food preferences. Using the decision model previously described, natural cues can be identified and selected for each skill targeted for instruction.

Zeaman and House (1963) proposed that a major factor influencing the poor performance of mentally retarded students on discrimination tasks is their failure to attend to the most relevant cues. Through the use of a backwards learning curve, they demonstrated that performance is generally at chance level until an abrupt change occurs, followed by acquisition of the desired discriminative response. According to Zeaman and House (1963) this abrupt change signified the point at which discrimination learning begins:

> ...the visual discrimination learning of mentally retarded children requires the acquisition of a chain of two responses: 1) attending to the relevant stimulus dimension; and 2) approaching the correct cue of that dimension. The difficulty that retardates (sic) have in discrimination learning is related to limitations in the first, or attention, phase of this dual process rather than the second (p. 220).

More recent investigations of essentially the same theory have been conducted, and the results support the contention that severely handicapped individuals have difficulty selectively attending to the salient features of visual stimuli (Boersma & Muir, 1975; Krupski, 1979).

A related finding within the context of discrimination tasks is that the more salient the relevant cue, the greater the likelihood that a student will attend to it, and the faster the rate of skill acquisition (Miller, 1979; Suchman & Trabasso, 1966). Many attempts have been made to

examine the saliency of cues in discrimination learning by severely handicapped students. For example, contrast, size, complexity, novelty, and brightness are all features that have been identified as enhancing selective attention (Fantz, Fagan, & Miranda, 1975; Gibson, 1969; Lubker, 1967, 1969a, b; Stevenson, 1972).

Decisions as to which natural cues to reference during instruction must be based on individual learning and performance characteristics. Obviously, if a student is blind, visual cues would not be selected. Furthermore, to enhance generalization, the selection of cues should account for the notion of programming common stimuli (Stokes & Baer, 1977). In accordance with this notion, the cues that are available in generalization or untrained environments might be incorporated into the training environment. For example, examination of a department store might reveal that "an array of filler paper" and "crayons" serve as relevant natural cues for locating a notebook. This might be in contrast to the training environment, where a sign with the printed label "school supplies" is identified as the relevant cue. This information might lead to a decision to reference all three cues during instruction in the training environment. An example of a natural cue inventory used to produce this information is presented in Table 4. This table contains a listing of cues available in three department stores when performing the skills necessary to "browse for" a notebook.

D. Determining the Types of Teaching Procedures to Use in Community Environments

The decision model presented in Figure 1 uses as its framework the order of skills that naturally occur in a community environment (a nonhandicapped person inventory). This framework provides the basis from which skills can be targeted and natural cues and consequences can be selected. Decisions still need to be made about the type of teaching procedure to use in a community environment. More specifically, decisions must be made about: 1) the prompting procedures used to accentuate the natural cues; 2) the point at which the intervention should occur; 3) the procedures used to strengthen a response; and 4) the procedures used to fade instructional cues.

1. The prompting procedures used to accentuate the relevant cues

In keeping with the notion that the more salient the natural cue, the more likely a student is to attend to it, educators have examined the effectiveness of teaching procedures designed to accentuate the salient features of cues and thus increase the rate of skill acquisition on discrimination tasks. Wolfe and Cuvo (1978) described two categories of procedures used to accentuate relevant cues: within-stimulus prompting and extra-stimulus prompting.

Wolfe and Cuvo (1978) described within-stimulus prompting as a procedure which alters the stimuli which should trigger a response so as to accentuate their critical features. They found that students learned significantly more letters when they were trained using within-stimulus prompting (i.e., accentuating critical features of the

Table 4

A Natural Cue Inventory of Three Department Stores

Natural Cues			Parallel Responses For Examining A Notebook
K-Mart Department Store	Capps Department Store	Shopko Department Store	
Aisles/areas that have not been examined	Aisles/areas that have not been examined	Aisles/areas that have not been examined	1. Turns in the direction of unexamined displays in search of item.
Items not desired	Items not desired	Items not desired	2. Scans and walks past displays that do not have the desired item until within view of the cues associated with the location of that item.
Filler paper, crayons	"School Supplies" sign, crayons	"School Supplies" sign, cork board, tape, folders, notebooks	3. Moves purposefully (e.g., fixates on array, turns deliberately) in the direction of the desired item.
Notebooks, folders, filler paper	Notebooks, folders	Notebooks, folders	4. Stands in front of the display of items and scans for the specific item desired.
A spiral notebook	A spiral notebook	A spiral notebook	5. Removes item from display and examines.
Yellow tag on front cover of notebook, 77¢	Yellow tag on back of notebook, 39¢	White tag on back of notebook, 59¢	6. Locates price (e.g., points, verbalizes, enters into calculator).
Shelf with same items	Shelf with same items	Shelf with same items	7. Returns the item to the appropriate location.

stimuli, such as darkening the print of one letter) as compared to extra-stimulus prompting (i.e., adding a topographically different cue, such as pointing a finger).

Within-stimulus prompting is a procedure that has been used effectively in many community instructional situations. Consider a student who is learning to set the table in a domestic training site. The task requires positioning a plate, napkin, knife, fork, spoon, and glass on a placemat. An outline of each item is drawn on the placemat to accentuate relative positions and unique shapes. As learning occurs, these outlines are faded until the drawings are no longer needed in order to perform the task in an acceptable manner.

Another example involves the task of locating a personalized time card at work. All the employee cards, including the student's, have labels printed across the top with the individual's identification number, last name, and first name. Although the student has learned to recognize his name in other contexts, it becomes obvious that he needs instruction on this newly-encountered discrimination task. The teacher decides to darken the letters of his first name to facilitate the discrimination process. This within-stimulus procedure is used with the intention of fading the darkened letters until the student can discriminate among the original printed labels.

A final example of a within-stimulus procedure involves a student who is learning to locate a box of cereal in a grocery store. A within-stimulus prompt is provided by positioning the box in front of the other cereal boxes. The intention is to fade the cue accentuation by gradually moving the box back to its original location.

A distinction should be made between within-stimulus prompting and the use of redundant cues. A within-stimulus prompt makes use of the natural features of the stimuli themselves. The use of a redundant cue often goes beyond the accentuation of natural features and adds powerful but unrelated cues to facilitate a discriminative response. For example, Gold (1972) demonstrated that through the use of redundant cues involving color coding, a 15-piece assembly task could be completed in half the trials needed by the students who did not use the color coded parts. Two years later, Gold (1974) studied three different procedures designed to fade the color cues. All three fading procedures worked equally well. Perhaps, the significance of this latter study lies in the acknowledgement that the efficiency of redundant cue training must be counterbalanced with the time needed to fade those cues. When the ultimate goal is for the student to respond to naturally-occurring stimuli, the time required to fade the redundant cues is an important factor.

There are, however, occasions when redundant cues are created without the intention of fading them. Instead, they become integral components of the task and can be referred to as adaptations, or more specifically, as "material adaptations" (Baumgart et al., 1982). To illustrate how the use of such cues differs from that of a within-stimulus procedure, the reader is reminded of one of the examples of

a within-stimulus prompt given previously. The example involved darkening letters on a time card to facilitate the discriminative response of a student who was to find his card among those of his co-workers. One can easily see how the darkened letters could be faded until the student ultimately responded to the natural cue of his printed name. But consider a different student who is blind and is receiving training at that same vocational site. Her time card was adapted with a raised impression of a symbol which she learned to recognize as her name. When creating this adaptation, the teacher had no intention of fading it to the point where the student would be responding solely to the natural cue of the printed name.

While within-stimulus prompting and the adaptation of materials can be effective tools when providing instruction in some community environments, their limitations become obvious when considering their use in others. Although one might be able to convince an employer to color-code shelves in a stock room to simplify a vocational task, it is doubtful that such an adaptation would be received favorably by department store officials. Imagine trying to convince a department store manager to paint arrows on the floors of the aisles in order to provide redundant cues for severely handicapped students to shop in a systematic fashion! An alternative to within-stimulus prompting and adaptations of materials is what Wolfe and Cuvo (1978) have referred to as "extra-stimulus prompting."

Wolfe and Cuvo (1978) described extra-stimulus prompting as a procedure which adds a topographically different cue, such as pointing a finger, in an attempt to facilitate discrimination. Teachers often do this by providing verbal cues, gestures, physical guidance, modeling, etc. Ideally, extra-stimulus prompting should be carried out in a manner such that the critical features of the relevant natural cues are referenced. Most would agree that it is better to reference the natural cue than not; yet this orientation does not always exist in practice. For example, a female student was learning to use a public restroom located in a shopping mall. The teacher pointed to the appropriate door and said "Here is the bathroom," and then wheeled the student through the entrance. The teacher made no attempt to reference the relevant natural cue of the symbol ( ) located on the front of the door. Nor did the teacher highlight the "skirt-like" shape in an attempt to facilitate the discrimination between the men's and women's symbols.

2. The point at which the intervention should occur

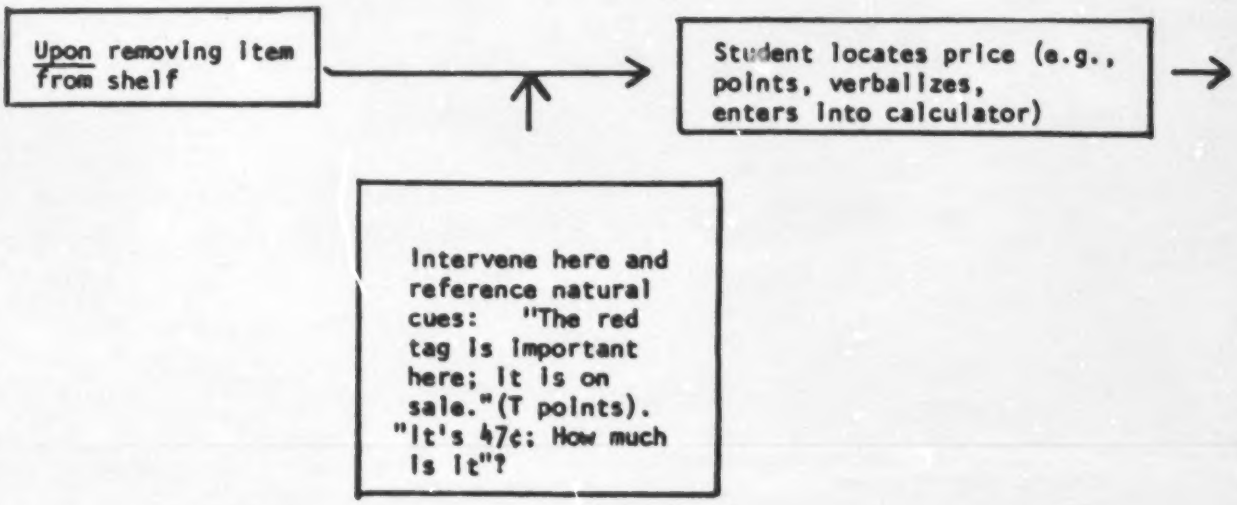
Experience reveals that simply exposing students to community environments does not ensure efficient or successful skill acquisition. Individualized instruction accentuating the relevant natural cues must be provided if students are to acquire and maintain skills in community environments. The natural cues can be referenced at two points: before a response occurs (an antecedent teaching procedure); or after a response occurs (a consequential teaching procedure).

An antecedent teaching procedure refers to an intervention in which a sufficient amount of information is provided before a response is made so as to minimize the probability that an error will occur. Variations of antecedent teaching procedures have also been referred to as "errorless learning" (Sidman & Stoddard, 1967; Tawney, 1972; Terrace, 1963). For purposes of intervening in community environments, this strategy requires that the teacher use some combination of verbal cues, gestures, models, and/or physical prompts to reference the natural cue to which the student should respond, immediately following the completion of the previous response in the sequence. This is done in a manner so as to preclude an error from occurring and ensure a correct response. In order to implement an antecedent procedure, the teacher must know in advance the steps in the skill sequence where the student will require intervention and must be available to offer the necessary information before an error occurs. Furthermore, when providing antecedent instruction, careful consideration must be given to the temporal relationship between the point at which a cue should become operative and the point at which a response to that cue is actually required. This is particularly true for cues which become operative long before a direct response is required. For example, when purchasing gum in a department store, a student receiving antecedent instruction would be prompted to recall that "gum" is the desired item and to move in the direction of the candy rack. The actual response of securing a package of gum from the shelf may not occur until 30 seconds later, when the student is actually in front of the candy and gum rack.

Example: Jacki is a 13-year-old student labelled moderately mentally handicapped. She has been receiving instruction in a grocery store setting for several months, and is able to perform all of the necessary skills except those related to locating the price of items; she makes repeated errors in this area. Her teacher decides to intervene before Jacki makes an error by pointing to the price tag on each item immediately after Jacki has removed the item from the shelf. In addition, her teacher verbally references the natural cue by saying, "Here is the price tag; it is 47¢. How much is it?" After several sessions during which no errors have been allowed to occur, the antecedent assistance is gradually decreased and faded out as Jacki begins to recognize the price tag on her own. A sequential presentation of an antecedent teaching procedure is depicted in the upper portion of Figure 2.

Example: Roger is a 15-year-old student with autism who is receiving instruction in riding the city bus. Because of Roger's tendency to tantrum when he is corrected, and because of the safety considerations involved in the activity itself, his teacher decides to institute an antecedent teaching procedure. Roger is provided with verbal and physical prompts before each step in the bus riding sequence to ensure errorless performance. Over the next 6 months, the intensity of the prompts is gradually faded until Roger can perform the entire sequence independently.

An Antecedent Teaching Procedure


Upon removing item from shelf
Student locates price (e.g., points, verbalizes, enters into calculator)
Intervene here and reference natural cues: "The red tag is important here; it is on sale."(T points). "It's 47¢; How much is it"?

A Consequential Teaching Procedure

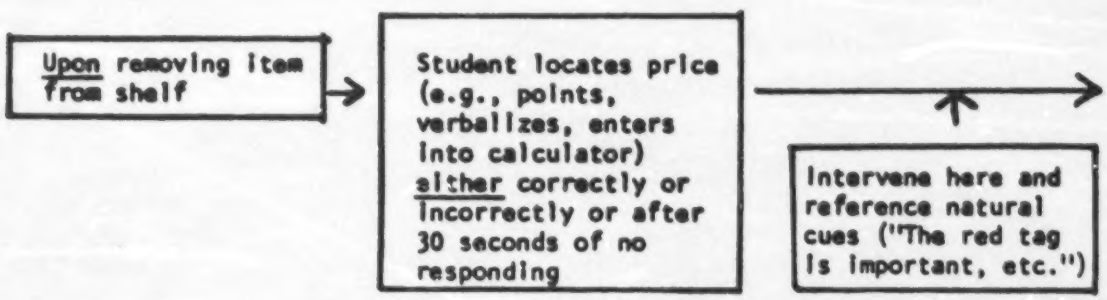

Upon removing item from shelf
Student locates price (e.g., points, verbalizes, enters into calculator) either correctly or incorrectly or after 30 seconds of no responding
Intervene here and reference natural cues ("The red tag is important, etc.")

Figure 2. A sequential presentation of antecedent and consequential teaching procedures.

A consequential teaching procedure refers to an intervention in which a student is allowed to make a response without the provision of teacher prompts. If the student fails to emit the correct response within a preset latency period, then corrective information is provided. In other words, the intervention occurs after a response is made. A variation of this procedure has been referred to as an "increasing assistance" approach (Csapo, 1981; Gentry et al., 1979), and has been used effectively during the fluency-building phase of learning in particular. Since errors can occur, the teacher must be careful to use this procedure only for students who will not be negatively affected by making mistakes or by receiving corrective information.

Example: Sarah is a 10-year-old student labeled moderately mentally handicapped. She has been receiving instruction in a grocery store setting for several months. According to a preset performance criteria, Sarah has reached the fluency phase on the task of interpreting price tags. Sarah's teacher now feels that it is appropriate to use a consequential teaching procedure. Thus, Sarah is allowed to examine a package of candy for 10 seconds, and upon the absence of a purposeful response (e.g., pointing to a serial number or pointing to the red sale tag) the teacher intervenes by pointing out the correct price to her. A sequential presentation of a consequential teaching procedure is depicted in the lower portion of Figure 2 on page 171.

Example: Sam is a 19-year-old student who has cerebral palsy and is mentally retarded. In the past, Sam has demonstrated the ability to learn from his mistakes and to problem-solve in new situations. After first providing instruction using an antecedent procedure to build initial skills, Sam's teacher decides to use a consequential strategy during vocational training at the local hospital. Sam is allowed to make errors and to attempt self-correction when packaging sterile instruments, and consequential assistance is provided only after it is clear that Sam is unable to solve the problem by himself. In addition to encouraging Sam to use his problem-solving abilities, the use of this approach enables the teacher to offer more directive instruction to the other two students at the site.

3. The procedure used to strengthen a response

It is often necessary to use reinforcement systems other than those naturally available in community settings. Because of the complex and public nature of community environments, reinforcement procedures such as tokens, food rewards, lavish praise, and some types of physical affection may be inappropriate. If the use of such "artificial" procedures is critical to enable a particular student to make progress, nonstigmatizing methods of dispensing the reinforcements should be devised. Whenever possible, the use of such procedures should be paired with the naturally-occurring reinforcers available in a particular environment.

Example: Craig, age 16, is receiving instruction at the Sunco gas station. Craig has a short attention span and requires frequent reinforcement in order to stay on task and complete his job. He enjoys watching the mechanic work on the cars in the shop, so his teacher decides to incorporate this interest into his instructional program. He is assigned to work as an "assistant" to the mechanic in the garage, where he is instructed in cleaning tools, wiping counters, sorting auto parts, sweeping and mopping the floor, and so forth. Initially, he is given frequent breaks upon completion of each small task, so that he can watch the mechanic work as a reward for task completion. The work time is gradually lengthened as Craig becomes more proficient and requires less reinforcement for this efforts.

4. The procedure used to fade instructional cues

Fading procedures are used to systematically decrease the amount of teacher intervention provided. These strategies are appropriately used once the student has achieved some degree of mastery of the steps in the skill sequence. The fading of instructional cues in community environments can be accomplished through many strategies. Three ways to fade instructional cues are discussed below.

First, fading instructional cues designed to prompt, correct, or reinforce a response can be accomplished by decreasing the amount of physical direction; by using indirect verbal cues ("What do you have to do next?"); or by allowing a longer latency period between two responses so that the student has the opportunity to initiate the second response without the use of instructional cues.

Example: As Sean, age 13, begins to master the steps involved in making the bed at the Travel Haven motel, his teacher gradually decreases the amount of physical contact she provides to help him smooth the top sheet, blanket, and spread; and uses fewer direct verbal cues to help him move through the sequence. Though Sean's performance rate initially drops, he becomes more independent over the next 2 weeks, and within a month he is able to make the bed independently within an appropriate amount of time.

A second procedure that can be used to fade instructional cues involves modeling. This can be done in a slightly exaggerated way, so that the student's attention is drawn to the correct response being demonstrated.

Example: Michael, age 20, has made limited progress in learning to order his food at the Hamburger Haven sitdown restaurant. He seems to have become dependent on teacher direction for the skills involved in ordering his food. In order to avoid strengthening this dependence, his teacher decides to switch to a modeling strategy as a means of fading her direct assistance. She selects this strategy because she knows that Michael has excellent imitation skills. She arranges for Michael to sit with two other students who she believes will benefit from an indirect modeling procedure. During the next several sessions at the restaurant, she places Michael and his peers in a position where they can readily observe her as she

models the ordering routine. She slightly exaggerates her responses to make them more salient; for instance, she says, "I think I'll get the menu now" and reaches for it with a pronounced gesture; and when the waitress comes to take the order, she gives her order in a somewhat louder voice than usual. Throughout this procedure she checks to make sure the students are attending. Upon observing the teacher, Michael eventually initiates the necessary responses, and is able to order without direct teacher assistance.

A final fading strategy involves decreasing teacher-student proximity. It is common for a teacher to sit with a student in a restaurant, or to accompany her to the break room at a vocational site, even when there is little need for teacher assistance. Though relatively simple, a strategy designed to fade physical presence is often overlooked even after students have mastered select skills. Proximity fading is a useful strategy which can be used unobtrusively in many community environments.

Example: Adrienne, age 14, no longer requires much direct instruction in riding the public bus. Therefore, over a period of time, her teacher gradually moves away from Adrienne, so that she boards the bus on her own, sits by herself, and is allowed to independently initiate the responses involved in exiting at the correct stop. Eventually, the teacher stops riding the bus with Adrienne altogether, and instead follows the bus in her car and meets Adrienne at her stop. The teacher is available to assist Adrienne should she experience any difficulty, but does not actively involve herself in giving instruction or feedback unless necessary.

The teaching procedures discussed in this section represent only a few of the options available to those who plan and provide instruction in community environments. Determining which prompting procedure(s) to use to accentuate the relevant cue, whether to intervene antecedently or consequentially, how to strengthen a response, and when to fade instructional cues will depend on which stage of learning a student has entered. These stages and how they influence instructional decisions are discussed in the following section.

E. Determining the Data Collection Procedures That Will Result in Meaningful Programmatic Changes

In this section, data collection procedures will be described which involve: 1) targeting a manageable number of skills; 2) using a four-point measurement system to secure performance information on the targeted skills; and 3) analyzing the data to ascertain which skills have been acquired.

1. Targeting a manageable number of skills

The sequence of skills necessary to engage in a particular activity can be quite lengthy. When the entire nonhandicapped person inventory is used as a continuous assessment tool, it may become unmanageable and, as a result, may lose much of its instructional value. In fact,

when attempts are made to record the performance of a student in relation to each skill in the sequence, it is often at the expense of instruction. Rather than treat each skill as a separate entity, a teacher might group many of the skills together because of their parallel functions. The designation of a parallel skill is based on the notion that the performance of one skill in a sequence may be topographically similar to another. Consider a student who is learning to browse in a department store. He or she is to examine records, magazines, hair accessories, and gum. The skills required to examine one item are very similar to those required to examine others. For example, the response of replacing "People" magazine on the rack in the department store involves identifying another item with the same cues (e.g., the same pictures on the cover; the label "People") or recalling its original location. Similarly, the response of replacing the Trident gum involves the identification of an item with similar cues (e.g., blue and white package; and label "Trident") or recalling its original location. Thus, a parallel skill entitled, "Returns the item to the appropriate location" can be designated. Table 5 presents an inventory of browsing in a department store which has been adapted to enable the measurement of parallel skills.

2. Using a four-point measurement system

Probably the most popular measurement system used by teachers involves the recording of a plus (+) if the student performs a skill correctly and a minus (-) if he/she does not. Although this may be adequate for some informational needs, it is less so when information about the nature of an error is desired. The denotation of a minus merely indicates that the student did not perform the skill correctly. It does not offer insight as to how the skill was misperformed, and thus, the teacher has little information that can be used to make future intervention decisions. Consider the shortcomings of this system as presented in the following example provided by Livi and Ford (1983):

> As a part of the activity of "making a sandwich," Shawn was to perform the skill, "Obtain a loaf of bread." A minus was recorded on the data sheet indicating that Shawn did not obtain the bread. But it did not indicate whether he:
>
> a) initiated the response by moving toward a location in which the bread would be likely to be found (e.g., cupboard, refrigerator, and breadbox);
>
> b) responded to the relevant natural cues which are specific to that site (e.g., the breadbox is the relevant cue, in that it is the place where the bread is located in the nonschool domestic training site);
>
> c) performed the actions in a topographically acceptable manner by opening the breadbox and grasping the loaf of bread; and
>
> d) performed the actions in a qualitatively acceptable manner by grasping the bread with reasonable pressure, removing the loaf, leaving the other contents inside the box and so forth.

Table 5

An Inventory Which Includes the Parallel Skills to Be Measured Across All of the Items Examined in the Department Store

1. Enters the department store.
2. Arranges list (picture or written) and calculator (if appropriate) for ready use.
3. Examines item on list.

Parallel Skills	Items			
	Record	Magazine	Hair Accessories	Gum
a. Turns in the direction of unexamined displays in search of item.				
b. Scans and walks past displays that do not have the desired item until within view of the cues associated with the location of the item desired.				
c. Moves purposefully (e.g., fixates on array, turns deliberately) in the direction of the desired item.				
d. Stands in front of the display of items and scans for the specific item desired.				
e. Removes item from display and examines.				
f. Locates price (e.g., points, verbalizes, enters into calculator)				
g. Returns the item to the appropriate location.				

4. Searches for cash register by walking down main aisle in the direction of check-out counters.
5. Scans area, to left and right, and continues search by walking past aisles and areas that are not check-out counters; until within view of "front of store"; service desk.
6. Turns in the direction of check-out counters.
7. Locates check-out counters.
8. Stands at the end of line.
9. Moves in line.
10. Places item on counter.
11. Greets - verbally or gesturally - the clerk.
12. Gives clerk money.
13. Receives change.
14. Picks up package.
15. Responds to other verbal cues of clerk.
16. Leaves the department store.

To provide more precise information about an incorrect response, a four-point measurement system was developed which included:

a) the initiation of the response;

b) the response to the relevant natural cues;

c) the performance of the actions in a topographically acceptable manner; and

d) the performance of the actions in a qualitatively acceptable manner.

Using this four-point system, Shawn's performance on the skill, "obtains a loaf of bread" might be recorded as:

Conditions	Skills	Initiates	Responds to relevant natural cue(s)	Performs in Topographically Acceptable Manner	Performs in Qualitatively Acceptable Manner
A breadbox located on the counter	Obtains a loaf of bread	+	-	+	-

These data now offer much more precise information about Shawn's performance. They indicate that he: a) initiated the response (he opened the cupboard in search of the bread); b) did not respond to the relevant natural cue (the relevant cue was the breadbox, not the cupboard; c) performed the actions in a topographically acceptable manner (upon informing Shawn of the correct location of the bread, he was able to perform the motions necessary to remove it from the box); and d) did not perform the actions in a qualitatively acceptable manner (Shawn exerted so much pressure on the loaf that several of the pieces could not be placed in the toaster).

3. Ascertaining the amount of learning that has occurred

One primary objective of instruction in the community for severely handicapped students should be the acquisition of those skills that will be important to their current or future functioning. However, the maintenance and generalization of skill performance are at least as important to the success of a program as is the actual acquisition. Thus, a critical question that must be asked is, "When should instruction be terminated in the training environment so that measures of generalization and maintenance can be instituted?"

Often, the decision to terminate instruction in the community training environment is based on a time-determined progression. That is, at the start of the semester or the school year, instruction in a particular community environment is scheduled for a preset period of time (e.g., grocery shopping instruction occurs each Tuesday morning for 2 months, at which time it is replaced by restaurant instruction). This scheduling practice is usually done to ensure that each student in the class has a reasonable amount of access to a wide array of environments. While such long term scheduling is important, attempts should be made to build in a certain degree of flexibility. Adjustments in the schedule are often necessary due to the unpredictable performance of students.

Student performance can be characterized by various stages of learning. Liberty, Haring, and Martin (1981) have described four stages of learning: the acquisition stage, the fluency stage, the maintenance stage and the generalization stage. Each of these stages can influence the decisions to terminate instruction in a community environment and to arrange for maintenance and generalization probes.

The acquisition stage of learning is concerned with the skills that are missing from the repertoire of a severely handicapped student. During this stage of learning, emphasis is placed on teaching the student to perform the targeted skills in a topographically correct manner in response to relevant natural cues. Here, little emphasis is placed on time dimensions, such as how long it takes the student to perform the skill or the latency at which a response occurs.

> Example: Rachel, age 7, is receiving instruction in street-crossing twice each week on her way from school to the local library and shopping mall. One of the skills targeted in the street-crossing sequence is to push the "walk" button at four lighted intersections encountered during the walk. Rachel has now acquired this skill based on a preset performance criterion. That is, she is able to identify the intersections that have the "walk" buttons and push them without teacher assistance. Although she has learned these actions, it still takes her an inordinate amount of time to scan the environment, locate the button, and push it. Therefore, instruction is planned for the next stage of learning, which is fluency. During that stage, the latency and rate difficulties will be addressed.

The fluency stage of learning is concerned with the time dimensions of performance. Thus, while acquisition of a skill may entail the performance of a topographically correct response to a natural cue (e.g., reaching for the knife during a meal preparation activity), fluency may require that the action be performed within a reasonable time period (e.g., grasping the knife within 7 seconds).

Example: Crystal is a 17-year-old student who is diagnosed as paraplegic and mentally retarded. She is learning to make a peanut butter and cracker snack in a domestic training site. For several weeks, her teacher has used an antecedent training procedure to teach Crystal to prepare a snack (three crackers with peanut butter). While she is able to perform many of the actions necessary to prepare this snack, her rate is very slow. Originally, the teacher planned to switch from the "cracker" preparation to "sandwich" preparation at the end of 3 weeks. However, in Crystal's case, a decision was made to continue instruction to build fluency on the targeted skills. When Crystal has become more fluent on the targeted skills, generalization sessions will be held to determine the extent to which the skills required to prepare a cracker snack transfer to the sandwich-making activity.

The maintenance stage of learning is concerned with the performance of previously acquired, fluent skills across time.

Example: Larry, an 11-year-old severely handicapped student, was taught to function in a fast food restaurant. When he became fluent in a select number of targeted skills, instruction was terminated in that environment. Eight weeks later, Larry returned to the restaurant in which he had been trained. Data were collected to ascertain the extent to which the skills previously acquired were maintained. Greater than 90% of the skills were maintained. Therefore, no further instruction was provided at that site. Plans were made, however, to schedule maintenance sessions until that environment ceased to be important to Larry.

The generalization stage of learning is concerned with the performance of previously acquired, fluent skills across persons, places, and materials. Typically, generalization is said to have occurred when the skills acquired in the training environment are performed in a similar but novel nontraining environment.

Example: Jeanette is a 12-year-old student who is deaf and blind. She has been receiving vocational instruction at the state office building located in Capitol City. She has been working on preparing mailings for the personnel department. Recently, she has become quite fluent at this task. Consequently, the teacher has decided to arrange for a generalization session. This arrangement will involve moving Jeanette to a new department in the building where she will be expected to perform a similar task but under novel conditions.

IV. SUMMARY

The teaching procedures discussed in this paper are meant to be representative of some of the options available to a teacher providing instruction in community environments. The selection of a procedure

or combination of procedures should be based on an individual student's learning style and rate, as well as on the requirements of the community environment. Unfortunately, this is not always the case. Procedures are often selected at random, and the resulting instruction is not nearly as efficient as it could be. Teachers must be aware that there is a wide range of procedural options available, and that if students fail to acquire skills in a community environment, the instructional procedures, not the students, are likely to be at fault. Though non-school instruction presents challenges not encountered in school-based programming, a variety of procedures do exist which can be adapted and applied in community environments.

V. REFERENCES

Baer, D.M., Wolf, M., & Risley, T.R. (1968). Some current dimensions of applied behavior analysis. Journal of Applied Behavior Analysis, 1, 91-97.

Bandura, A. (1969). Principles of behavior modification. New York: Holt, Rinehart and Winston.

Baumgart, D., Brown, L., Pumpian, I., Nisbet, J., Ford, A., Sweet, M., Messina, R., & Schroeder, J. (1982). Principle of partial participation and individualized adaptations in educational programs for severely handicapped students. Journal of The Association for the Severely Handicapped, 7(2), 17-27.

Boersma, F.J., & Muir, W. (1975). Eye movements and information processing in mentally retarded children. Rotterdam: University Press.

Brown, L., Falvey, M., Vincent, L., Kaye, N., Johnson F., Ferrara-Parrish, P., & Gruenewald, L. (1980). Strategies for generating comprehensive, longitudinal and chronological age appropriate individual education programs for adolescent and young adult severely handicapped students. Journal of Special Education, 14(2), 199-215.

Brown, L., Nietupski, J., & Hamre-Nietupski, S. (1976). The criterion of ultimate functioning and public school services for severely handicapped students. In M.A. Thomas (Ed.), Hey, don't forget about me: Education's investment in the severely, profoundly and multiply handicapped. Reston, VA: The Council for Exceptional Children.

Brown, L., Nisbet, J., Ford, A., Sweet, M., Shiraga, B., & Loomis, R. (1982). The critical need for nonschool instruction in educational programs for severely handicapped students. In L. Brown, J. Nisbet, A. Ford, M. Sweet, B. Shiraga, & L. Gruenewald (Eds.), Educational programs for severely handicapped students, Vol. XII. Madison, WI: Madison Metropolitan School District.

Republished: (1983). The Journal of The Association for the Severely Handicapped, 8(3), 71-77.

Brown, L., Shiraga, B., Ford, A., Nisbet, J., VanDeventer, P., Sweet, M., York, J. & Loomis, R. (1983). Teaching severely handicapped students to perform meaningful work in nonsheltered vocational environments. In L. Brown, J. Nisbet, A. Ford, M. Sweet, B. Shiraga, R. Loomis, & P. VanDeventer (Eds.), Educational programs for severely handicapped students, Vol. XIII. Madison, WI: Madison Metropolitan School District.

Revised and republished: (In press). R. Morris & B. Blatt (Eds.), Perspectives in special education: State of the art. Glenview, IL: Scott Foresman Company.

Coon, M., Vogelsberg, R.T., & Williams, W. (1981). Effects of classroom public transportation instruction in generalization to the natural environment. Journal of The Association for the Severely Handicapped, 6(2), 46-53.

Csapo, M. (1981). Comparison of two prompting procedures to increase response fluency among severely handicapped learners. Journal of The Association for the Severely Handicapped, 6(1), 39-47.

Donnellan, A.M., & Miranda, P. L. (in press). A model for analyzing instructional components to facilitate generalization for severely handicapped students. Journal of Special Education.

Entrikin, D., York, R., & Brown, L. (1975). Teaching trainable level multiply handicapped students to use picture cues, context cues, and initial sounds to determine the labels of unknown words. In L. Brown, T. Crowner, W. Williams, & R. York (Eds.), Madison's alternative for zero exclusion: A book of readings, Vol. V. Madison, WI: Madison Metropolitan School District.

Falvey, M., Brown, L., Lyon, S., Baumgart, D., & Schroeder, J. (1980). Strategies for using cues and correction procedures. In W. Sailor, B. Wilcox, & L. Brown (Eds.), Methods of instruction for severely handicapped students (pp. 109-134). Baltimore: Paul H. Brookes.

Fantz, R.L., Fagan, J.F., & Miranda, S.B. (1975). Early visual selectivity. In L.B. Cohen & P. Salapatek (Eds.), Infant perception: From sensation to cognition, Vol. I. Basic visual processes (pp. 249-345). New York: Academic Press.

Ford, A. (1983). The performance of moderately and severely handicapped students in community environments as a function of the cues available and the antecedent versus consequential teaching procedures used. Unpublished doctoral dissertation, University of Wisconsin - Madison.

Ford, A., Brown, L., Pumpian, I., Baumgart, D., Nisbet, J., Schroeder, J., & Loomis, R. (1983). Strategies for developing individualized recreation and leisure programs for severely handicapped students. In N. Certo, N. Haring, & R. York (Eds.), Public school integration of the severely handicapped: Rationale, issues, and progressive alternatives. Baltimore: Paul H. Brookes.

Ford, A., Davis, J., Messina, R., Ranieri, L., Nisbet, J., & Sweet, M. (1982). Arranging instruction to ensure the active participation of severely multihandicapped students. In L. Brown, J. Nisbet, A. Ford, M. Sweet, B. Shiraga, & L. Gruenewald (Eds.), Educational programs for severely handicapped students, Vol. XII. Madison, WI: Madison Metropolitan School District.

Gentry, D., Day, M., & Nakao, C. (1979). The effectiveness of two-prompt sequencing procedures for discrimination learning with severely handicapped individuals. Moscow: University of Idaho.

Gibson, E.J. (1969). Principles of perceptual learning and development. New York: Appleton-Century-Crofts.

Gold, M. (1972). Stimulus factors in skill training of the retarded on a complex assembly task: Acquisition, transfer, and retention. American Journal of Mental Deficiency, 76, 517-526.

Gold, M. (1974). Redundant cue removal in skill training for the retarded. Education and Training of the Mentally Retarded, 9(1), 5-8.

Guess, D., Horner, D., Utley, B., Holvoet, J., Maxon, D., Tucker, D., & Warren, S. (1978). A functional curriculum sequencing model for teaching the severely handicapped. AAESPH Review, 3, 202-215.

Hamre-Nietupski, S., Nietupski, J., Bates, P., & Maurer, S. (1982). Implementing a community-based educational model for moderately/severely handicapped students: Common problems and suggested solutions. Journal of The Association for the Severely Handicapped, 7(4), 38-43.

Hart, B., & Risley, T. (1975). Incidental teaching of language in the preschool. Journal of Applied Behavior Analysis, 8, 411-420.

Hart, B., & Risley, T. (1980). In vivo language intervention: Unanticipated general effects. Journal of Applied Behavior Analysis, 13, 407-432.

Hart, B., & Rogers-Warren, A. (1978). A milieu approach to teaching language. In R.L. Schiefelbusch (Ed.), Language intervention strategies. Baltimore: University Park Press.

Hill, T., Wehman, P., & Horst, G. (1982). Toward generalization of appropriate leisure and social behavior in severely handicapped youth: Pinball machine use. Journal of The Association for the Severely Handicapped, 6(4), 38-44.

Holvoet, J., Guess, D., Mulligan, M., & Brown, F. (1980). The individualized curriculum sequencing model (II): A teaching strategy for severely handicapped students. Journal of the Association for the Severely Handicapped, 5(4), 337-351.

Itard, J.M.G. (1932). The wild boy of Aveyron (G. Humphrey, Trans.). New York: Appleton-Century-Crofts (original work published 1894).

Krupski, A. (1979). Are retarded children more distractible? Observational analysis of retarded and nonretarded children's classroom behavior. American Journal of Mental Deficiency, 84, 1-10.

Liberty, K.A., Haring, N.G., & Martin, M.M. (1981). Teaching new skills to the severely handicapped. Journal of The Association for the Severely Handicapped, 6(1), 5-13.

Livi, J., & Ford, A. (1983). Investigating transfer of training from a domestic training site to the actual homes of three severely handicapped students. In L. Brown, Ford, A., Nisbet, J., Sweet, M., Shiraga, B., York, J., Loomis, R. & VanDeventer, P. Educational programs for severely handicapped students, Vol. XIII. Madison, WI: Madison Metropolitan School District.

Lubker, B.J. (1967). Irrelevant stimulus dimensions and children's performance in simultaneous discrimination problems. Child Development, 8, 119-125.

Lubker, B.J. (1969a). Setting similarity and successive discrimination learning by children. Journal of Experimental Child Psychology, 7, 188-194.

Lubker, B.J. (1969b). The role of between -and within- setting irrelevant dimensions in children's simultaneous discrimination learning. Child Development, 40, 957-964.

Martin, G.L., Kehoe, B., Bird, E., Jensen, V., & Darbyshire, M. (1971). Operant conditioning in dressing behavior of severely retarded girls. Mental Retardation, 9(3), 27-30.

Miller, P. (1979). Stimulus dimensions, problem solving and Piaget. In G. Hale & M. Lewis (Eds.), Attention and cognitive development. New York: Plenum Press.

Montessori, M. (1964). The Montessori method (A.E. George, Trans.). New York: Schocken Books. (Original work published, 1912.)

Neef, N., Iwata, B., & Page, T. (1978). Public transportation training: In vivo versus classroom instruction. Journal of Applied Behavior Analysis, 11, 331-344.

Page, T.J., Iwata, B., & Neef, N. (1976). Teaching pedestrian skills to retarded persons: Generalization from the classroom to the natural environment. Journal of Applied Behavior Analysis, 9, 433-444.

Rusch, F., Weithers, J., Menchetti, B., & Schutz, R. (1980). Social validation of a program to reduce topic repetition in a nonsheltered setting. Education and Training of the Mentally Retarded, 15, 208-215.

Sailor, W., & Guess, D. (1983). Severely handicapped students: An instructional design. Boston: Houghton Mifflin Co.

Seguin, E. (1907). Idiocy: And its treatment by the physiological method. New York: Columbia University Press. (Original work published, 1864.)

Sidman, M., & Stoddard, L. (1967). The effectiveness of fading in programming a simultaneous form discrimination for retarded children. Journal of Experimental Analysis of Behavior, 10, 3-15.

Skinner, B.F. (1968). The technology of teaching. New York: Appleton-Century-Crofts.

Stevenson, H.W. (1972). Children's learning. New York: Prentice-Hall.

Stokes, T.F., & Baer, D.M. (1977). An implicit technology of generalization. Journal of Applied Behavior Analysis, 10, 349-367.

Suchman, R.G., & Trabasso, T. (1966). Stimulus preference and cue function in young children's concept attainment. Journal of Experimental Child Psychology, 3, 188-198.

Sweet, M., Shiraga, B., Ford, A., Nisbet, J., Graff, S., & Loomis, R. (1982). Vocational training: Are ecological strategies applicable for severely multihandicapped students? In L. Brown, J. Nisbet, A. Ford, M. Sweet, B. Shiraga, & L. Gruenewald (Eds.), Educational programs for severely handicapped students, Vol. XII. Madison, WI: Madison Metropolitan School District.

Tawney, J. (1972). Training letter discrimination in four year old children. Journal of Applied Behavior Analysis, 5, 455-465.

Terrace, H. (1963). Discrimination learning with and without "errors." Journal of the Experimental Analysis of Behavior, 6, 1-27.

van den Pol, R., Iwata, B., Ivancic, T., Page, T., Neef, N., & Whitley, F. (1981). Teaching the handicapped to eat in public places: Acquisition, generalization and maintenance of restaurant skills. Journal of Applied Behavior Analysis, 14(1), 61-69.

Warren, S.F., Rogers-Warren, A., Baer, D.M., & Guess, D. (1980). Assessment and facilitation of language generalization. In W. Sailor, B. Wilcox & L. Brown (Eds.), Methods of Instruction for severely handicapped students. Baltimore: Paul H. Brookes.

Wehman, P., & Hill, J. (1982). Preparing severely handicapped youth for less restrictive environments. Journal of The Association for the Severely Handicapped, 7(1), 33-39.

Wheeler, J., Ford, A., Nietupski, J., & Brown, L. (1980). Teaching moderately and severely handicapped adolescents to shop in supermarkets using pocket calculators. Education and Training of the Mentally Retarded, 15(2), 108-112.

Wolfe, V., & Cuvo, A. (1978). Effects of within-stimulus and extra-stimulus prompting on letter discrimination by mentally retarded persons. American Journal of Mental Deficiency, 83 (3), 297-303.

Zeaman, D., & House, B.J. (1963). The role of attention in retardate discrimination learning. In N.R. Ellis (Eds.), Handbook of mental deficiency. New York: McGraw-Hill.